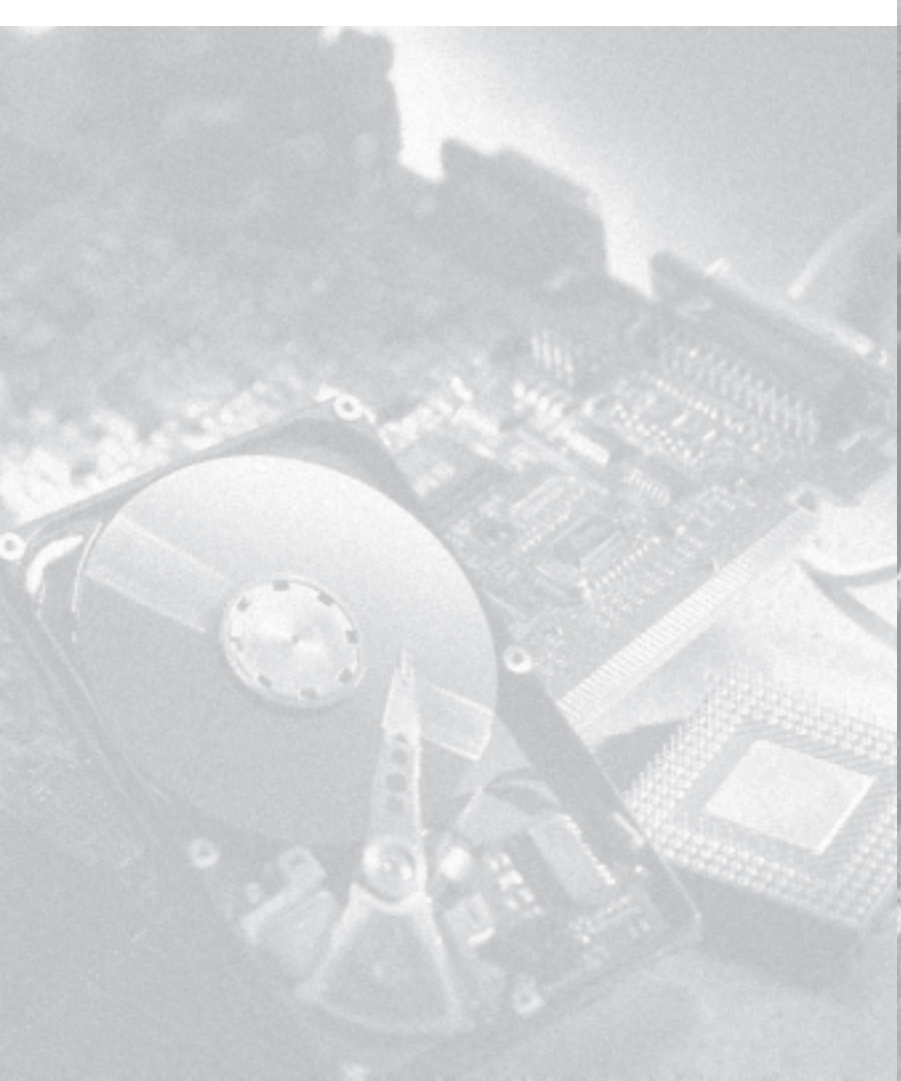
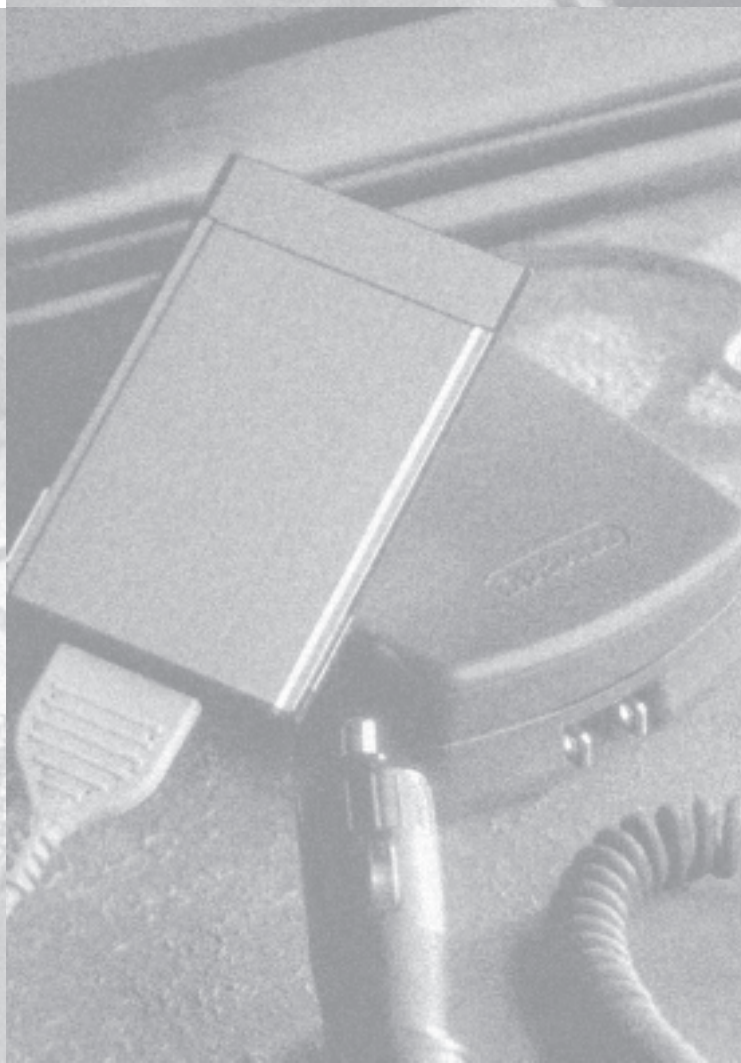
COMPAQ

MAINTENANCE & SERVICE GUIDE ADDENDUM

Compaq Armada 1500
Family of Personal Computers





Notice

The information in this guide is subject to change without notice.

COMPAQ COMPUTER CORPORATION SHALL NOT BE LIABLE FOR TECHNICAL OR EDITORIAL ERRORS OR OMISSIONS CONTAINED HEREIN; NOR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE FURNISHING, PERFORMANCE, OR USE OF THIS MATERIAL.

This guide contains information protected by copyright. No part of this guide may be photocopied or reproduced in any form without prior written consent from Compaq Computer Corporation.

© 1998 Compaq Computer Corporation.
All rights reserved. Printed in the U.S.A.

Compaq, LTE, Contura, ProLinea, QuickLock, QuickBlank are registered in the U. S. Patent and Trademark Office. Armada is a trademark of Compaq Computer Corporation.

Contura is registered in the Philippines Patent Office.

Microsoft, MS-DOS, and Windows are registered trademarks of Microsoft Corporation. Windows 95 is a trademark of Microsoft Corporation.

The software described in this guide is furnished under a license agreement or nondisclosure agreement. The software may be used or copied only in accordance with the terms of the agreement. Product names mentioned herein may be trademarks and/or registered trademarks of their respective companies.

Maintenance and Service Guide Addendum

Compaq Armada 1500 Family of Personal Computers

First Edition (January 1998)
Spare Part Number 255011-001
Document Part Number 255318-001

Compaq Computer Corporation

Computer Product Description

1.1 Models and Features

The following information describes new models and features of the Compaq Armada 1500 Family of Personal Computers. Selected models include Pentium processors with MMX technology, faster internal modem, larger hard drive, faster internal CD-ROM drive, and mechanical enhancements to the base enclosure. A list of standard features and supported options are provided in Chapter 1 of the *Maintenance and Service Guide, Compaq Armada 1500 Family of Personal Computers.* The following computer models are available:

Compaq Armada 1500 Family Models

Model	Pentium Processor	Display	Hard Drive	Memory Std / Max	Level 2 Cache	CD-ROM	Modem (Kbps)	Serial Configuration
1530D	133-MHz	12.1 STN	1.4-GB	16/80 MB	256-Kbyte	10X	—	BRX1
1530DM	133-MHz	12.1 STN	1.4-GB	16/80 MB	256-Kbyte	10X	33.6	BRX2
1535DM	133-MHz	12.1 STN	1.4-GB	16/80 MB	256-Kbyte	12X	33.6	BRX3
1540D	150-MHz	12.1 TFT	2.1-GB	16/80 MB	256-Kbyte	20X	—	BRX5
1540DM	150-MHz	12.1 TFT	2.1-GB	16/80 MB	256-Kbyte	20X	33.6	BRX6
1545DM	150-MHz	12.1 TFT	2.1-GB	16/80 MB	256-Kbyte	20X	56	BT61
1560	166-MHz	12.1 STN	2.1-GB	16/80 MB	256-Kbyte	—	—	BT51
1560D	166-MHz	12.1 STN	2.1-GB	16/80 MB	256-Kbyte	20X	—	BT52
1560DM	166-MHz	12.1 STN	2.1-GB	16/80 MB	256-Kbyte	20X	56	BT53
1580DT	150-MHz	12.1 TFT	2.1-GB	16/80 MB	256-Kbyte	10X	—	BM58
1580DMT	150-MHz	12.1 TFT	2.1-GB	16/80 MB	256-Kbyte	10X	33.6	BM59
1585DMT	150-MHz	12.1 TFT	2.1-GB	16/80 MB	256-Kbyte	12X	33.6	BRX4
1590DT	166-MHz	12.1 TFT	2.1-GB	16/80 MB	256-Kbyte	20X	—	BRX7
1590DMT	166-MHz	12.1 TFT	2.1-GB	16/80 MB	256-Kbyte	20X	33.6	BRX8
1592DT	233-MHz MMX	12.1 TFT	3.2-GB	32/96 MB	512-Kbyte	20X	—	BT54
1592DMT	233-MHz MMX	12.1 TFT	3.2-GB	32/96 MB	512-Kbyte	20X	56	BT55

1.2 Features

The following features are provided on selected models:

- EDO Dynamic Random Access Memory (DRAM) system memory: 16-MB expandable to 80-MB, or 32-MB expandable to 96-MB
- 1.44-GB, 2.1-GB or 3.2-GB hard drive
- 11.3-inch Super Twisted Neumatic (STN) or 12.1-inch Thin Film Transistors (TFT) SVGA display
- 33.6Kbps integrated modem or 56Kbps internal controllerless modem. (Both are standard on selected models and available as an option on other models.)
- Internal CD-ROM Drive standard on selected models and available as an option on other models
- Universal Serial Bus (USB) connector standard on selected models
- 2-MB video memory
- 256-Kbyte L2 Cache memory, or 512-Kbyte L2 Cache memory
- Two standard device slots that will accommodate two types I and II and one type III PC Cards, PCMCIA and Bus cards; Compaq Telephony modem in the top slot and Zoomed-Video in the bottom slot

The following features are provided on all models:

- Supports Lithium Ion (Li-ion) and Nickel Metal Hydride (NiMH) modular battery packs
- SoundBlaster-compatible audio controller with internal stereo speakers and internal microphone
- Full-size 101 key compatible keyboard including 12 function keys, 8 cursor control keys, inverted-T cursor control keys and embedded numeric keypad
- Four user-programmable keys
- Touchpad pointing device
- Operates from an internal battery pack, plus an optional battery pack in the Dualbay, or integrated AC power that is compatible with domestic and international power sources
- Power management and security features

- Infrared interface for wireless communications with other IrDA-compliant devices at data rates up to 4 MB/sec
- 176 pin expansion connector provides the interface to the Convenience Base options
- Rear-panel ports provide connections for parallel and serial, external monitor, keyboard/mouse and IrDA compliant infrared devices

1.3 Software Fulfillment

Replacement software may be ordered directly from Compaq Computer Corporation. Both the model and the serial number of the computer are needed to identify the specific software available.

1.4 External Computer Components

The following information provides new mechanical changes to the models, which are different from earlier models

Universal Serial Bus

A Universal Serial Bus (USB) connector has been added to select models on the left side of the computer. The connector provides an interface for USB peripheral devices.

On models without the USB connector, a plastic insert covers the connector space. The plastic USB cover is included in spare part 254981-001, the miscellaneous spare parts kit. The kit also ships with such items as replacement clutch covers, rubber feet, battery spacer door, etc. (See Chapter 4 in the *Maintenance and Service Guide* for miscellaneous spare parts.)

Battery Spacer Door

IMPORTANT: The Battery Spacer Door, which is a component of the Dualbay compartment, has been modified.

The new battery spacer door pushes ❶pushes inward with a single motion, as compared to the previous version ❷ which pulled out and pushed inward (
Figure 1-1).

NOTE: The Battery Spacer Door is included in the miscellaneous spare parts kit (spare part 254981-001).

Figure 1-1. *New Battery Spacer Door*

Illustrated Parts for the Computer

4.0 Illustrated Parts for the Computer

For an illustrated parts breakdown, refer to the *Illustrated Parts Map*. The following information provides new spare parts descriptions and part numbers.

The following tables are updated to include the new spare parts. For illustrations of spare parts, refer to the *Maintenance and Service Guide, Compaq Armada 1500 Personal Computers* or *Illustrated Parts Map.*

Table 4-1
System Unit

Description	Model(s)	Spare Part Number
Keyboard Assembly		
US/Canada	All models	254968-001
Belgian	All models	254968-181
Brazilian	All models	254968-035
Danish	All models	254968-081
French	All models	254968-051
French Canadian	All models	254968-121
German	All models	254968-041
Italian	All models	254968-061
Japanese	All models	254968-191
Korean	All models	254968-033
Latin American	All models	254968-161
Norwegian	All models	254968-101
Portuguese	All models	254968-131
Spanish	All models	254968-071
Swedish/Finnish	All models	254968-091
Swiss	All models	254968-111
Taiwanese	All models	254968-034
UK	All models	254968-031
Top Cover Assembly (keyboard cover)	All models	254978-001
Speakers	All models	254979-001
Base enclosure assembly	1510, 1510DM, 1520, 1520D, 1520DM, 1530D, 1530DM, 1535DM, 1550T, 1550DMT, 1575DMT, 1580DT, 1580DMT, 1590DT, 1590DMT	254969-001
Base enclosure assembly	1540D, 1540DM, 1560DT, 1560DMT, 1590DT, 1590DMT	212535-001
Display Assembly		
11.3 inch STN	1510, 1510DM, 1520, 1520D, 1520DM	254966-001
12.1 inch TFT	1550T, 1550DMT, 1580DT, 1580DMT, 1585DMT, 1590DT, 1590DMT	254967-001
12.1 inch TFT	1592DT, 1592DMT	255308-001
12.1 inch STN	1530, 1530D, 1530DM, 1535DM, 1540D, 1540DM, 1560, 1560D, 1560DM	255131-001

Table 4-2
Mass Storage Devices

Description	Model(s)	Spare Part Number
CD-ROM		
10X CD-ROM Drive	1510DM. 1520D, 1520DM, 1550DMT, 1530D, 1530DM, 1580DT, 1580DMT	254974-001
20X Max CD-ROM Drive	1540D, 1540DM, 1560D, 1560DM, 1560DT, 1560DMT, 1590DT, 1590DMT, 1592DT, 1592DMT	255215-001
Hard Drive		
1.08GB, 3 inch /2.5 inch	1510, 1510DM, 1520, 1520D, 1520DM	254963-001
1.44GB, 3 inch/2.5 inch	1530, 1530D, 1530DM, 1535DM, 1550T, 1550DMT	254964-001
2.1-GB	1540D, 1560, 1580DT, 1580DMT, 1585DMT, 1590DT	255130-001
3.2-GB	1560D, 1560DM, 1592DT, 1592DMT	255248-001
Diskette Drive		
1.44MB Diskette Drive	All models	254962-001
Battery Packs		
NiMH	All models	254959-001
Li-Ion	All models	254960-001

Table 4-3
Cables and Power Cords

Description	Model(s)	Spare Part Number
CD-ROM Cable	All models	254975-001
Modem Cable	All models	165224-001
AC Adapter, internal	All models	254961-001
AC Power Cord	Refer to the *Maintenance & Service Guide*	Refer to the *Maintenance & Service Guide*
RTC Battery (with cable)	All models	254971-001
Microphone	All models	254981-001
Fan	1510,1510DM,1520, 1520D, 1520DM, 1530D, 1530DM, 1535DM, 1550T, 1550DMT, 1575DMT, 1580DT, 1580DMT, 1585DMT	254977-001
Fan	1540D, 1540DM, 1560, 1560D, 1560DM, 1590DT, 1590DMT, 1592DT,1592DMT	255194-001

Table 4-4
Standard and Optional Boards

Description	Model(s)	Spare Part Number
LED Board		
11.3 inch display LED board	1510, 1510DM, 1520, 1520D, 1520DM	254958-001
12.1 inch TFT display LED board	1550T, 1550DMT, 1580DT, 1580DMT, 1585DMT	255049-001
12.1 inch STN display LED board	1530, 1530D, 1530DM, 1535DM, 1540D, 1540DM, 1560, 1560D, 1560DM	255189-001
12.1 inch TFT display LED board	1590DT, 1590DMT, 1592DT,1592DMT	255190-001
I/O Fixture Connector	All models	254956-001
DC/DC Converter Board	All models (except MMX models)	254976-001
DC/DC Converter Board, 2.5 / 2.45 / 2.9v	All MMX models except as noted below	255161-001
DC/DC Converter Board, 1.8v	Armada 1592	255262-001
Audio Board	All models	254957-001
System CPU Board		
120-MHz processor	1510, 1510DM	254949-001
133-MHz processor	1520, 1520D, 1520DM, 1550T, 1550DMT	255010-001
133-MHz processor with MMX	1530, 1530D, 1530DM, 1535DM	255129-001
150-MHz processor	1580DT, 1580DMT, 1585DMT	255071-001
150-MHz processor with MMX	1540D, 1540DM	255187-001
166-MHz processor with MMX	1560, 1560D, 1560DM	255310-001
166-MHz processor with MMX	1590DT, 1590DMT	255188-001
233-MHz MMX processor	1592DT, 1592DMT	255246-001

Table 4-5
Options

Description	Models	Spare Part Number
Power Cord		
US/Canada/Latin America/Brazil	All models	246959-001
Australia/New Zealand	All models	246959-011
Denmark	All models	246959-081
Europe	All models	246959-021
Italy	All models	246959-061
Japan	All models	246959-291
Korea	All models	246959-AD1
Switzerland	All models	246959-AG1
UK/Singapore	All models	246959-031
Automobile Adapter	All models	218079-001
Battery Packs		
NiMH	All models	254959-001
Li-Ion	All models	254960-001
Battery Charger	All models	950970-001

Table 4-6
Miscellaneous Parts

Description	Model(s)	Spare Part Number
Miscellaneous Plastics Kit, includes: **Left clutch cover** **Microphone/display cable cover** **Right clutch cover** **Battery spacer door** **CD-ROM access door** **Modem access door** **Rubber feet**	All models All models with integrated CD-ROM drives	254981-001
Display Logos	All models	255013-001
Hinge and Latch Kit, includes: Display clutch retaining plate (2 each) Display clutch (2 each) Display latch (2 each) Display latch spring (2 each) Rubber screw covers (4 each)	All models	254982-001
Miscellaneous Screw Kit, includes T-8, long (50 each) T-8, short (10 each) T-8, with Ny-Loc (4 each) 7mm (10 each) 5 mm (10 each)	All models	254980-001
Miscellaneous Plastics Kit	All models	254981-001
Maintenance and Service Guide	All models	255011-001
Illustrated Parts Map	All models	255012-001
Armada 1500 Software CD	All models	255097-001
Quick Restore Software CD for model 1535DM	All models	255180-001
Quick Restore Software CD for model 1585DMT	All models	255181-001

Table 4-7
Accessories

Description	Models	Spare Part Number
Power Cord		
US/Canada/Latin America/Brazil	All models	246959-001
Australia/New Zealand	All models	246959-011
Denmark	All models	246959-081
Europe	All models	246959-021
Italy	All models	246959-061
Japan	All models	246959-291
Korea	All models	246959-AD1
Switzerland	All models	246959-AG1
UK/Singapore	All models	246959-031
Automobile Adapter	All models	218079-001
Battery Packs		
NiMH		254959-001
Li-Ion		254960-001
Battery Charger		950970-001
Convenience Bases		
Convenience Base Pass-Through model		254988-001
Convenience Base Ethernet model with 10BaseT		254987-001
Convenience Base BNC model with 10BaseT		254989-001
Monitor Stand		254990-001
100BaseT Ethernet Upgrade		225436-001
Modem		
33.6 Data/Fax Modem with install diskette	1510DM, 1520DM, 1530DM, 1535DM, 1540DM, 1550DMT, 1580DMT, 1585DMT, 1590DMT	***North America*** 255014-001 ***Japan*** 255014-191 ***Asia*** 255014-371
56K Voice / Fax / Data Modem (controllerless, integrated)	1560DM, 1592DMT	255245-001
Modem Cable (RJ11)	All models	165224-001
10' AC Power Cord Extension		
US	All models	255135-001
Australia	All models	255135-011
Denmark	All models	255135-081
Europe	All models	255135-021
Italy	All models	255135-061
Japan	All models	255135-291
Korea	All models	255135-AD1
UK	All models	255135-031
Singapore	All models	255135-111

Option Spares

Table 4-8
Accessories

Description	Models	Spare Part Number
Memory Expansion Board		
8MB	All models	272108-001
16MB	All models	272110-001
32MB	All models	220583-001
64MB	All models	273158-001
CD-ROM Drive		
10X CD-ROM Drive	All models	254974-001
20X Max CD-ROM Drive	All models	255215-001
56K Voice/Fax/Data Modem (Controllerless, Integrated)	All models	255245-001
33.6 Data/Fax Modem (Integrated)	All models	255014-001

9.0 Specifications

This chapter provides specifications on the following new components:

- 2.1-GB Hard Drive
- 3.2-GB Hard Drive
- 20X Max CD-ROM
- 12.1-inch TFT, SVGA display

Table 9-1
Hard Drives

Standard Model Configurations	2.1-GB	3.2-GB
Formatted Capacity Per Drive (MB)		
Physical	2.16	3.24
Logical	2.1	3.2
Drive Type	65	65
Drive Height		
With drive frame (mm)	12.7mm	12.7mm
Drive Size		
Inches	3.94 x 2.75	4.01 x 2.75
Millimeters	100.2 x 69.85	102 x 69.85
Transfer Rate		
Media (Mb/s)	38.1 to 54.8	51.7 to 83.4
Interface (Mb/s)	16.6	33.3
Sector Interleave	1:1	1:1
Typical Seek Time (including setting)		
Single Track (ms)	4	4
Average (ms)	13	13
Full Stroke (ms)	23	23
Disk Rotational Speed	4,200	4,000
Physical Configuration		
Cylinders	4928	6975
Data Heads	6	5
Sectors per Track	110-180	144-240
Bytes per Sector	512	512
Logical Configuration		
Cylinders	4200	6304
Data Heads	16	16
Sectors per Track	63	63
Bytes per Sector	512	512
Buffer Size	128	128

Table 9-2
20X Max CD-ROM Drive

Applicable Disc	CD-ROM mode 1, mode 2
	CD-Digital Audio
	CD-XA mode 2 (Form 1, Form 2)
	CD-I mode 2 (Form 1, Form 2)
	CD-I Ready
	CD-Bridge
	CD-WO (fixed / variable packets)
	Photo CD (single / multi-session)
Center Hole Diameter	15mm
Disc Diameter	12cm, 8cm
Disc Thickness	1.2mm
Track Pitch	1.6 µm
Laser	
Beam Divergence	53.5 ± 1.5 degrees
Output Power	0.13 ± 0.1 mw
Type	Semiconductor Laser GaA1As
Wave Length	780 nm ± 25 nm
Access Time	
Random	< 150 ms
Full Stroke	< 600 ms
Audio Output Level	
Line Out	0.7 Vrms
Headphone	None
Cache Buffer	256 KB
Data Transfer Rate	
Sustained, quad	300 MB/sec
Sustained, single	150 KB/sec
Burst	8.3 MB/sec
Startup Time	< 10 seconds typical
Capacity	
Mode 1, 12 cm	550 MB
Mode 2, 12 cm	640 MB
8 cm	180 MB

Table 9-3
12.1-inch TFT, SVGA Display

	U.S.	Metric
Dimensions		
Height	7.24 in.	184 mm
Width	9.7 in.	245 mm
Number of Colors	16 million	16 million
Contrast Ration	Over 100:1	Over 100:1
Pixel Resolution		
Pitch	0.30 x 0.30 mm	0.30 x 0.30 mm
Format	800 x 600	800 x 600
Configuration	RGB Stripe	RGB Stripe
Backlight	130 cd/m^2	130 cd/m^2

Appendix C

Modem Commands

This section includes modem commands for the 56Kbps internal modem. The telephony modem is designed to operate with the preinstalled software in the computer. The modem is compatible with Microsoft Windows 95 (and later) or Windows NT 4.0.

Table C-1
Modem Commands

Command	Description
A	Answer Command. A instructs the modem to go off-hook and answer an incoming call.
Bn	Communication Standard Setting. Bn determines CCIT vs. Bell standard. 0: Selects CCITT V .22 mode when the modem is at 1200bits/s 1: Selects Bell 212A when the modem is at 1200bits/s (default). 2: Unselects V23 reverse channel (same as B3). 3: Unselects V23 reverse channel (same as B2). 15: Selects V.21 when the modem is at 300 bits/s 16: Selects Bell 103J when the modem isat 300 bits/s (default). Result Codes: OK n=0, 1, 15, 16 ERROR Otherwise
Cn	Carrier Control. The modem will accept the C1 command without error in order to assure backward compatibility with communications software that issues the C1 command. However, this modem does not support the C0 command. The C0 command may instruct some earlier modems (such as the Smartmodem 1200) to not send carrier (ie., it puts them in a receive-only mode). 0: Transmit carrier always off. 1: Normal transmit carrier switching. Result Codes: OK n=1 ERROR Otherwise

Continued

Table C-1, Modem Commands, *Continued*

Command	Description
Dn	Dial Command. Dn instructs the modem to begin the dialing sequence. The dial string (n, including modifiers and the telephone number) is entered after the ATD command. A dial string can be up to 40 characters long. Any digit or symbol (0—9, *, #, A, B, C, D) may be dialed as touch tone digits. Characters such as spaces, hyphens, and parentheses do not count—they are ignored by the modem and may be included in the dial string to enhance readability. The following may be used as dial string modifiers: L Redials last number. Should be the first character following TD, ignored otherwise. P Pulse dialing T Touch-tone dialing (default). V The modem switches to speakerphone mode and dials the number. An ATH command may be used to disconnect the voice call. , Pause during dialing. Pause for time specified in Register S8 before processing the next character in the dial string. W Wait for dial tome. Modem waits for a second dial tone before processing the dial string. @ Wait for quiet answer. Wait for five seconds of silence after dialing the number. If silence is not detected, the modem sends a NO ANSWER result code back to the user. ! Hook flash. Causes the modem to go on-hook for 0.5 seconds and then return to off-hook. ; Return to command mode. Causes the modem to return to command mode after dialing the number, without disconnecting the call. ^ Disable data calling tone transmission. A, B, C, D Letters (DTMF tone dialing mode only) S=n Dial a telephone number previously stored using the &Zn=x command (see the &Zn=x command for further information). The range of n is 0—3. $ Bong tone detection. The dial modifiers listed above (except S) shall be saved when dial strings are stored. The T and P modifiers are allowed anywhere in the dial string so signaling methods may be changed after some digits are already sent.
En	Echo Command. En controls whether or not the characters entered from your computer keyboard are echoed back to your monitor while the modem is in command mode. 0: Disables echo to the computer. 1: Enables echo to the computer (default). Result Codes: OK n=0, 1 ERROR Otherwise
Fn	Online Echo Control. Fn determines if the modem will echo data from the DTE. This modem does not support the F0 version of the command. However, the modem will accept F1, which may be issued by older communication software, to assure backward compatibility. 0: Online data character echo enabled (NOT SUPPORTED, ERROR). 1: Online character echo disabled. Result Codes: OK n=1 ERROR Otherwise

Continued

Table C-1, Modem Commands, *Continued*

Command	Description
Hn	Hook Control. Note that in some countries H1 will be limited by a timer (i.e., the maximum time off-hook without a carrier negotiation). In those cases, S7 or a hardcoded constant will be used for the upper limit of this timer. 0: Modem goes on-hook (default). 1: Modem goes off-hook. Result Codes: OK n=0, 1 ERROR Otherwise
In	Request ID Information. In desplays specific product information about the modem. 0: Returns default speed and controller firmware version, same as I3. 1: Calculates ROM checksum and displays it on the DTE (ie. F15D). 2: Performs a ROM check and calculates and verifies the checksum displaying OK or ERROR. 3: Returns the default speed and the controller firmware version, same as I0. 4: Returns firmware version for data pump (ie. 57). 5: Returns the board ID: software version, hardware version, and country ID. **Birdie Code Configuration / Default Country Support / Country Code(zz) / Country ID String (ccc)** -001 North America 19 NA -002 Japan 10 JPN -003 APD 14 SNG 9: Returns 2 or 3 character country ID string and 1 to 2 character version of country parameter table. (ie. ccc Ver. v).
Ln	Monitor Speaker Volume. Ln sets the speaker volume to low, medium, or high. 0: Selects low volume. 1: Selects low volume. 2: Selects medium volume (default). 3: Selects high volume.
Mn	Monitor Speaker Mode. Mn turns the speaker on or off. 0: The speaker is off 1: The speaker is on until the modem detects the carrier signal (default) 2: The speaker is always on when modem is off-hook. 3: The speaker is on until the carrier is detected, except while dialing.
Nn	Modulation Handshake. Nn controls whether or not the local modem performs a negotiated handshake at connection time with the remote modem when the communication speed of the two modems is different. The N command affects the initial physical layer connection only. It does not affect subsequent speed changes made by V.32bis or MNP class 10 operation. 0: When originating or answering, this is for handshake only at the communication standard specified by S37 and the ATB command. 1: When originating or answering, begin the handshake only at the communication standard specified by S37 and the ATB command. During handshake, fallback to a lower speed may occur (default).

Continued

Table C-1, Modem Commands, *Continued*

Command	Description
On	Return On-line to Data Mode. 0: If the modem is in the on-line command state, the O0 command causes it to go to the on-line state of the previously established connection. If the modem is off hook in the idle (off-line command) state, then the O0 command causes it to go to the handshaking state. Originate or answer mode is determined from the last D or A command, or R dial modifier that was selected. If the modem is on hook in the idle state, or if the modem is a test state, then the "ERROR" result code is returned, and no action is taken. 1: If the modem is in the on-line command state, the O1 command causes it to go to the on-line state of the previously established connection, and retrain its adaptive equalizer (if applicable). If the modem is off hook in the idle (off-line command) state, then the O1 command causes it to go to the handshaking state. Originate or answer mode is determined from the last D or A command, or R dial modifier that was selected. If the modem is on hook in the idle state, or if the modem is a test state, then the "ERROR" result code is returned, and no action is taken 3: If the modem is in the on-line command state, the O3 command causes it to go to the on-line state of the previously established connection, and issue a rate re negotiation sequence (if applicable). If the modem is off hook in the idle (off-line command) state, then the O3 command causes it to go to the handshaking state. Originate or answer mode is determined from the last D or A command, or R dial modifier that was selected. If the modem is on hook in the idle state, or if the modem is a test state, then the "ERROR" result code is returned, and no action is taken Also note that as the O command returns the modem to the online state, the protocol, compression, and connect message (as enabled by the W command and S95) will be displayed as if the connection was just being made.
P	Select Pulse Dialing. P will apply to all subsequent D commands, until altered by the T command or the T dial modifier. Note that P is both a command and a dial modifier.
Qn	Result Code Control. Result codes are informational messages sent from the modem and displayed on your monitor. Basic result codes are OK, CONNECT, RING, NO CARRIER, and ERROR. The ATQ command allows the user to turn result codes on or off. 0: Enables modem ot send result codes to the computer (default). 1: Disables modem from sending result codes to the computer.
Sr	Select S-register r. Sr is the command to query or write to the selected register. Sr=n: Select S-register r, and write value n to S-register r. Limited to writeable S-registers. Sr?: Select S-register r, read and report its value.
T	Select Tone Dialing. T is both a command and a dial modifier. Applies to all subsequent D commands, until modified by the P command or the P dial modifier. This command instructs the modem to send DTMF tones while dialing. This is the default setting.
Vn	DCE Response Format. Vn controls whether result codes (including call progress and negotiation progress messages) are displayed as words or their numeric equivalents. 0: Displays result codes as digits. 1: Displays result codes as text (default).
Wn	Result Code Option. 0: CONNECT result code reports DTE speed. Disable protocol result code. 1: CONNECT result code reports DTE speed. Enable protocol result code 2: CONNECT result code reports DCE speed. Enable protocl result codes (default).

Continued

Table C-1, Modem Commands, *Continued*

Command	Description
Xn	Result Code Selection and Call Progress Monitoring. Xn enables tone detection options used in the dialing process. As these functions are chosen, the modem chip set's result codes are also affected. Therefore, this command is frequently used to control the modem chip set's responses. The primary function of this control is to control the modem chip set's call response capabilities. **Ext. Result Code / Dial Tone Detect / Busy Tone Detect** X0: Disable / Disable / Disable X1: Enable / Disable / Disable X2: Enable / Enable / Disable X3: Enable / Disable / Enable X4: Enable / Enable / Enable (Default) X5: Enable / Enable / Enable X6: Enable / Enable / Enable X7: Disable / Enable / Enable
Extended Result Codes	Disabled: Displays only the basic result codes OK, CONNECT, RING, NO CARRIER, and ERROR Enabled: Displays basic result codes, along with the connect message and the modem's date, rate, and an indication of the modem's error correction and data compression operation
Dial Tone Detect	Disabled: The modem dials a call regardless of whether it detects a dial tone. The period of time the modem waits before dialing is specified in register S6. Enabled: The modem dials only upon detection of a dial tone, and disconnects the call if the dial tone is not detected within 10 seconds.
Busy Tone Detect	Disabled: The modem ignores any busy tones it receives. Enabled: The modem monitors for busy tones.
Yn	Long Space Disconnect. Long space disconnect is always disabled. 0: Disable long space disconnect (default). 1: Enable long space disconnect. NOT SUPPORTED
Zn	Recall Stored Profile. Zn instructs the modem chip set to go on-hook and restore the profile saved by the last &W command. Either Z0 or Z1 restores the same single profile. 0: Recall user profile. 1: Recall user profile.

Table C-2
AT Commands

Command	Description
&Bn	V.32 Auto Retrain. This modem always auto retrains. 0: Disable V.32 auto retrain—NOT SUPPORTED 1: Enable V.32 auto retrain (default)
&Cn	Data Carrier Detect (DCD) Control. Data Carrier Detect is a signal from the modem to your computer indicating that the carrier signal is being received from a remote modem. DCD normally turns off when the modem no longer detects the carrier sign. This command controls the modem's usage of the DCD pin of the DTE interface. 0: Carrier detect always "ON" 1: Carrier detect "ON" only when carrier is present (Default).
&Dn	Data Terminal Ready (DTR) Control. &Dn controls the modem's usage of the DTR pin of the DTE interface. 0: Ignore. The modem ignores the true status of DTR and treats it as always on. This should only be used if your computer does not provide DTR to the modem. 1: If the DTR signal is not detected while in on-line data mode, the modem enters command mode, issues OK result code, and remains connected. 2: If the DTR signal is not detected while in on-line data mode, the modem disconnects (default). 3: Reset on the on-to-off DTR transition.
&F	Load ROM Default Settings. &Fn loads the configuration stored and programmed at the factory. This operation replaces all of the command options and the S-register settings in the active configuration with factory values. This command is allowed only in the off-line command state and will return an ERROR result code if entered while on-line. To load the factory settings, this command must be issued by itself. 0: Restore factory defaults.
&Gn	V.22bis Guard Tone Control. &Gn determines which guard tone, if any, to transmit while transmitting in the high band (answer mode). This command is only used in V.22 and V.22bis mode. This option is not used in North America and is for international use only. 0 Guard tone disabled (default). 1: Sets guard tone to 550Hz. 2: Sets guard tone to 1800Hz
&Jn	Auxiliary Relay option. 0: The auxiliary relay is never closed (Default). 1: NOT SUPPORTED, responds ERROR
&Kn	Local Flow Control Selection. 0: Disable flow control. Same as \Q0 1: Reserved 2: Reserved 3: Enables hardware flow control (RTS/CTS). Same as \Q3 (default). 4: Enable software flow control (XON/XOFF). Same as \Q1.
&Mn	Asynchronous Communications Mode. 0: Asynchronous mode (default). 1: Reserved 2: Reserved 3: Reserved 4: Reserved

Continued

Table C-2, AT Commands, *Continued*

Command	Description
&P	Pulse Dial Make/Break Ratio Selection. Non-adjustable in some countries. In those countries the &P command shall be accepted and ignored. This command is effective only for Japan. 0: Make/break ratio 34/66% (default 1: Make/break ratio 33/66%
&Qn	Asynchronous Communications Mode. This setting also affects the usage of the DCD, DTR, CTS, and DSR signals in the DTE interface. 0: Asynchronous Mode, buffered. Same as \N0 or \N1 1: Reserved 2: Reserved 3: Reserved 4: Reserved 5: Enables error control mode, same as \N3. Same as \N3. (Default) 6: Selects asynchronous mode with Automatic Speed Buffering, ame as \N0. 7: Reserved 8: MNP error control mode. If an MNP error control protocol is not established, the modem will fall back according to the current user setting in S36. 9: V.42 or MNP error control mode. If neither error control protocol is established, the modem will fallback according to the current user setting in S36.
&Sn	Data Set Ready (DSR) Selection. &Sn selects DSR action. 0: DSR always ON (default). 1: DSR is OFF when the modem is in the idle state, and when the modem is in a test mode. DSR circuit is turned ON at the start of the handshaking process. DSR is turned off when the hangup process is started.
&Tn	Self-Test Commands. &Tn allows the user to perform diagnostic tests on the modem. These tests can help to isolate problems when experiencing periodic data loss or random errors. 0: Abort. Stops any test in progress. 1: Local analog loop. This test verifies modem operation as well as the connection between modem and computer. Any data entered at the local DTE is modulated, then demodulated and returned to the local DTE. To work properly, the modem must be off-line. 3: Begin digital loopback. &T3 is not allowed if an error control connection is in progress. 6: Remote digital loopback test. This test can verify the intregrity of the local modem, the communications link, and the remote modem. Any data entered at the local DTE is sent to and returned from, the remote modem. To work properly, the modems must be on-line with error control established.
&V	View Active Configuration and Stored Profile. &V is used to display the active profiles. 0: View active and store profile. 1: Display active profile and stored profile.
&Wn	Store Current Configuration. &Wn stores certain command options and S-register values into the modem's nonvolatile memory. The ATZ command or a power-up reset of the modem restores this profile. 0: Save active profile to user profile. 1: Not Supported. Will generate an ERROR.
&Yn	Designate Default User Profile. &Yn selects the user profile to be loaded upon power-up (or hardware reset). This command does not change the behavior of the modem but is included for compatibility with applications that issue the &Y0 command. 0: Select stored profile 0 1: Selects user profile 1(this generates an ERROR)

Continued

Table C-2, AT Commands, *Continued*

Command	Description
&Zn=s	Store Telephone Number. &Zn=s stores a 40 character string, retrievable by using the ATDS=n command. Assumes location 0 if n is omitted. When used, the &Z command must be the last command on the command line.): Store s in location 0 1: Store s in location 1 2: Store s in location 2 3: Store s in location 3
\G	Modem Port Flow Control. Applies to normal (ASB) mode only. 0: Returns and "OK" for compatibility (default). 1: NOT SUPPORTED responds ERROR
\J	Adjust Bits/s Rate Control. When this feature is enabled, the modem emulates the behavior of modems that force the DTE interface to the line speed (even for error control connections). This feature will help (but not guarantee) to prevent data loss is one or both DTE interfaces involved do not have flow control. 0: Turn off feature (default). 1: Turn on feature.
\K	Set Break Control. /K determines how the modem processes a Break signal received from the local DTE during a connection (online). 0: Reserved, returns ERROR. 1: Reserved, returns ERROR. 2: Reserved, returns ERROR. 3: Reserved, returns ERROR. 4: Reserved, returns ERROR. 5: Modem sheds the break to the remote modem in sequence with the transmitted data, non-destructive/non-expedited (default).
\Nn	Error Control Mode Selection. \Nn determines the type of error control used by the modem when sending or receiving data. 0: Selects normal (speed buffering) mode. No error control (same as &Q6). 1: Selects direct (pass through) mode. 2: *MNP** or disconnect mode. The modem attempts to connect using MNP 2—4 error control procedures. If this fails, the modem disconnects. This is also known as MNP reliable mode. 3: V.42, *MNP*, or buffer (default). The modem attempts to connect in V.42 error control mode. If this fails, the modem attempts to connect in *MNP* mode. If this fails, the modem connects in buffer mode and continues operation. This is also known as V.42/*MNP* auto reliable mode (same as &Q5). 4: V.42 or disconnect. The modem attempts to connect in V.42 error control mode. If this fails, the call will be disconnected. 5: V.42. *MNP* or buffer (same as \N3). 7: V.42. *MNP* or buffer (same as \N3).
\Q	Local Flow Control Selection. Also controllable via &K. 0: Disable flow control. Same as &K0. 1: XON/XOFF software flow control. Same as &K4. 2: CTS-only flow control. This is not supported and the response is ERROR. 3: Hardware flow control (RTS/CTS) (default). Same as &K3.

Continued

Table C-2, AT Commands, *Continued*

Command	Description
\Tn	Inactivity Timer. \Tn specifies the length of time (in minutes) that the modem will wait before disconnecting when no data is sent or received. A setting of zero disables the timer. Alternatively, this timer may be specified in register S30. Allowable range and default are country-specific. 0: Inactivity timer disabled (default). 1-255: Inactivity time in minutes. **MNP* is a registered Trademark of Microcom
\Vn	Protocol Result Code. Controls whether the string /ARQ is appended to the verbose CONNECT message if a protocol is in use. May also be controlled with bit 1 of S95. 0: Disable protocol result code appended to DCE speed. 1: Enable protocol result code appended to DCE speed (default).
\Xn	XON/XOFF Pass Through. When using XON/XOFF flow control, controls whether the flow control characters are also sent to the remote modem. 0: Process flow control characters locally. (default) 1: Process flow control characters locally, and pass them through to the remote modem so that they can process the characters. NOT SUPPORTED responds ERROR
&&C	Read from /Write to DSP Register. &&C<loc>,<val>: Write <val> to the DSP register at <loc> &&C<loc> Read from the DSP register at <loc>
&&L	Line to Line Loopback
&&R	Write to/Read from DSP RAM Location. AT&&R<loc>,<val>: Writes the value <val> to DSP RAM location <loc> AT&&R<loc>: Reads from location <loc>.
+FCLASS	Service Class Selection. This command sets the modem for class n operation. 000: data mode (default) 001: FAX class 1 008: voice mode Command options: +FCLASS=0 Select data mode. +FCLASS=1 Select Facsimile Class 1. +FCLASS=8 Select voice mode. +FCLASS? Causes the modem to display the current setting. +FCLASS=? Causes the modem to display the classes it supports.
-Cn	Data Calling Tone. Data Calling Tone is a tone of a certain frequency and cadence as specified in V.25 which allows remote Data/FAX/Voice discrimination. The frequency is 1300 Hz with a cadence of .5 s on and 2 s off. 0: Disabled (default). 1: Enabled.
%B	View Numbers in Blacklist. If blacklisting is in effect, this command displays the numbers for which the last call attempted in the past two hours failed. The ERROR result code appears in countries that do not require blacklisting.

Continued

Table C-2, AT Commands, *Continued*

Command	Description
%Cn	Data Compression Control. %Cn determines the operation of V.42bis and *MNP* class 5 data compression. Online changes do not take effect until a disconnect occurs first. 0: Disables V.42bis/*MNP* 5 data compression. 1: Enables *MNP* 5 data compression. (default)
+FCLASS=8	Enter Voice Mode. The command AT+FCLASS=8 puts the modem in voice mode. Speakerphone and TAD modes are subsumed under the more general heading of voice mode, and use a particular subset of voice mode commands to implement their respective features and functions. The modem controller will maintain the overall state of the system so as to know when voice commands are issued in the context of using the speakerphone or other voice contexts.
+VIP	Initialize Voice Parameters. The command AT+VIP causes the modem to initialize all the voice parameters to their default values. The command has no effect on the +FCLASS setting
+VDR	Distinctive Ringing & Cadence Report. This command will enable the distinctive ringing feature. This will allow a report of DROF/DRON to follow an exact ring cadence coming over the phone line. +VDR=<enable>,<report> +VDR?: Returns the current values of <enable> and <report> +VDR=?: Queries the DCE for the range of supported distinctive ring configurations
+VGS	(Same as +VGT)
+VGT	Speaker Volume Control. This command will enable the speaker volume control. +VGT=<level> <level> is 0-255 <level>=128: Nominal volume level for sending to speaker +VGT=? Returns the current microphone gain setting. +VGT=? (0-255)
+VGM	(same as +VGR)
+VGR	Receive Gain Selection. This command will enable the receive microphone gain control. <gain> is 0—255: the only useful range is 121—134 <gain>=128: Nominal level for receive gain from microphone Speakerphone mode—This command may be used to control the gain to the remote caller. +VGR? Returns the current receive gain setting. +VGR= (0-255)
+VEM	Event Reporting and Masking. The DTE can use this command to disable anevent report regardless of the DCE state, or of the analog signal source or destination configuration. Mask is Bits 0—33 (i.e., FFFFFFFFC). See the IS-101 specification for defined bit values. +VEM=<mask> +VEM? Returns the current values of the mask +VEM=? Queries the DCE for the range of supported service level events
+VIT	DTE/DCE Inactivity Timer. This command sets the DCE's value for the DTE/DCE inactivity timer. The units are in one seconds. +VIT? Returns the current value of the timer +VIT=? Queries the DCE for the range of supported values.

Continued

Table C-2, AT Commands, *Continued*

Command	Description
+VNH	Automatic Hang-up Control. This command causes the DCE to enable or disable automatic hangups in the data and facsimile modes. See the ISO-101 specification for the detailed description of this command and its interaction with the +FCLASS and ATH commands. +VNH=0 The DCE retains automatic hangups (which is the way in the other non-voice modes). +VNH=2 The DCE disables automatic hangups in the other non-voice modes. The DTE only performs a logical hangup (returns the "OK" result code).
+VLS	Analog Source/Destination Selection. This is a general purpose analog source/destination command that attaches various analog devices to the system in voice mode. +<VLS=<label> 0: Speakerphone off, detach analog devices, DCE on-hook. 1: Speakerphone in hold, detach analog devices, DCE off-hook. 2: DCE off-hook. 3: DCE off-hook. 5: Disables/detaches microphone analog source (leaving speaker only) when speakerphone is in operation (phone mute feature). 7: Speakerphone on, attach internal speaker and internal microphone, DCE off-hook. AT+VLS? Reports the current analog source/destination configuration, along with a listing of all event codes reported from the modem to the DTE under that configuration. AT+VLS=? Queries the DCE for the range of supported configurations and the list of unsolicited event codes that the modem will report to the DTE under each configuration. For speakerphone, the configurations supported are 0, 5, and 7—as explained above.

Table C-3
FAX Commands

Command	Description
+FCLASS=1	Enter FAX Mode. The command AT+FCLASS=1 puts the modem in FAX mode.
+FTS=<n>	Transmission Silence. This command causes the modem to stop transmitting data and pause for 10 * n ms. At the end of this period, the modem then responds **OK**. You can specify any number from 0 through 255 as the value of n; for example, a value of 5 specifies a period of 50 ms. This is a FAX command only, responds with the ERROR result code if in data mode.
+FRS=<n>	Receive Silence. This command causes the modem to listen and wait for a 10 * n ms period of silence on the line. At the end of this period, the modem then responds **OK**. You can specify any number from 0 through 255 as the value of n; for example, a value of 5 specifies a period of 50 ms. This is a FAX command only, responds with the ERROR result code if in data mode. N=0—255 (10 ms intervals)
+FTM=n	FAX data transmit protocol. This command causes the modem to transmit data at the modulation specified by <n>. This is a FAX command only, reponds with the ERROR result code if in data mode. The following table shows the values you can enter for this command and the meaning of those falues. **Command Option** — **Modulation** — **Speed (bits/s)** +FTM=3 — V.21 Channel 2 — 300 +FTM=24 — V.27ter — 2400 +FTM=48 — V.27ter — 4800 +FTM=72 — V.29 — 7200 +FTM=96 — V.29 — 9600 +FTM=73 — V.17 — 7200 +FTM=74 — V.17(short train) — 7200 +FTM=97 — V.17 — 9600 +FTM=98 — V.17(short train) — 9600 +FTM=121 — V.17 — 12000 +FTM=122 — V.17(short train) — 12000 +FTM=145 — V.17 — 14400 +FTM=146 — V.17(short train) — 14400
+FTM=?	Reports range of legal values for the +FTM command. The modem reports"3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146"
+FRM=n	FAX data receive protocol. This command causes the modem to receive data at the modulation specified by <n>. This is a FAX command only, responds with the ERROR result code if in data mode. The following table shows the values you can enter for this command and the meaning of those values. **Command Option** — **Modulation** — **Speed (bits/s)** +FRM=3 — V.21 Channel 2 — 300 +FRM=24 — V.27ter — 2400 +FRM=48 — V.27ter — 4800 +FRM=72 — V.29 — 7200 +FRM=96 — V.29 — 9600 +FRM=73 — V.17 — 7200 +FRM=74 — V.17(short train) — 7200 +FRM=97 — V.17 — 9600 +FRM=98 — V.17(short train) — 9600 +FRM=121 — V.17 — 12000 +FRM=122 — V.17(short train) — 12000 +FRM=145 — V.17 — 14400 +FRM=146 — V.17(short train) — 14400

Continued

Table C-3, FAX Commands, *Continued*

Command	Description
+FRM=?	Reports range of legal values for the +FRM command. The modem reports"3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146"
+FTH=n	FAX HDLC Transmit Carrier <n>. This command causes the modem to transmit data framed in the HDLC protocol at the modulation specified by <n>. This is a FAX command only, responds with the ERROR result code if in data mode. The following table shows the values you can enter for this command and the meaning of those values. **Command Option** / **Modulation** / **Speed (bits/s)** +FTH=3 / V.21 Channel 2 / 300 +FTH=24 / V.27ter / 2400 +FTH=48 / V.27ter / 4800 +FTH=72 / V.29 / 7200 +FTH=96 / V.29 / 9600 +FTH=73 / V.17 / 7200 +FTH=74 / V.17(short train) / 7200 +FTH=97 / V.17 / 9600 +FTH=98 / V.17(short train) / 9600 +FTH=121 / V.17 / 12000 +FTH=122 / V.17(short train) / 12000 +FTH=145 / V.17 / 14400 +FTH=146 / V.17(short train) / 14400
+FTH=?	Reports range of legal values for the +FTH command. The modem reports"3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146"
+FRH=n	FAX HDLC Receive Carrier <n>. This command causes the modem to receive data framed in the HDLC protocol at the modulation specified by <n>. This is a FAX command only, responds with the ERROR result code if in data mode. The following table shows the values you can enter for this command an the meaning of those values. **Command Option** / **Modulation** / **Speed (bits/s)** +FRH=3 / V.21 Channel 2 / 300 +FRH=24 / V.27ter / 2400 +FRH=48 / V.27ter / 4800 +FRH=72 / V.29 / 7200 +FRH=96 / V.29 / 9600 +FRH=73 / V.17 / 7200 +FRH=74 / V.17(short train) / 7200 +FRH=97 / V.17 / 9600 +FRH=98 / V.17(short train) / 9600 +FRH=121 / V.17 / 12000 +FRH=122 / V.17(short train) / 12000 +FRH=145 / V.17 / 14400 +FRH=146 / V.17(short train) / 14400
+FRH=?	Reports range of legal values for the +FRH command. The modem reports"3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146"